

Applicant's specification at page 5, lines 17-19, and see Figure 1 of the application.

At page 2 of the Office Action, Claims 1, 3-7 and 10 have been rejected under 35 U.S.C. 102(b) as being anticipated by Yokota JPA 62235909 A, with the Examiner citing the drawings (especially drawings 2,3 and 4) and the English-language abstract.<sup>1</sup> Applicants respectfully traverse the anticipation rejection for the reason that Yokota neither shows nor suggests the claimed invention.

The presently claimed invention is more removed from Yokota than the Examiner has admitted and recognized. Yokota is lacking more than the disclosure of gradient refractive index lens. Applicants' presently claimed invention provides an "optical fiber chip holding an end portion of an optical fiber and having an end surface treated to be inclined, wherein an optical axis of said optical fiber is eccentric with respect to a center of said lens to thereby set a quantity of eccentricity of said optical fiber so that the center of said lens substantially coincides with a center of a light beam incident on said lens from said optical fiber." (Applicants' Claim 1, emphasis added.) The eccentricity feature of Applicants' presently claimed invention is not disclosed or suggested in Yokota, and is a novel feature.

Furthermore, Claim 1 has been amended to require that an optical path of the fiber is eccentric with respect to a center axis of the optical fiber chip. This is best shown in Figures 1 and 6 of the application, and is discussed on page 7 of the application at lines 3-4. The described configuration suppresses light beam shading and aberration loss so as to achieve low insertion loss. Yokota never teaches nor suggests the feature that the optical path of the fiber is eccentric to the center axis of the chip. In fact, as best be understood from the drawings in Yokota, the optical path of the fiber is centrally located (not eccentric as required in the claims).

In conventional collimators, such as Yokota and others, a light beam emitted from the end surface of the optical fiber has a predetermined angle with

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<sup>1</sup>No full English-language translation of Yokota '909 has been made of record yet.

respect to the center axis of the rod lens (or the optical axis of the optical fiber).<sup>2</sup> When a local focal length lens would be used as the rod lens in such conventional collimators, the distance between the end surface of the optical fiber and the end surface of the rod lens became long.<sup>3</sup> If the rod lens and optical fiber in the conventional collimator was arranged so that the center axis of the rod lens coincided with the optical axis of the optical fiber, the center of a light beam emitted from the optical fiber slipped largely out of the center of the rod lens.<sup>4</sup>

Addressing this problem of conventional collimators, Applicants in their invention made the position of the optical path of the optical fiber eccentric relative to the center axis of the optical fiber chip.<sup>5</sup> In the presently claimed invention, the axis of the optical fiber chip is shifted on the basis of calculation of the eccentric quantity of the optical axis of the optical fiber in advance, so that a light beam refracted by the end surface of the optical fiber can be made just incident on the center of the end surface of the rod lens.<sup>6</sup>

The eccentricity feature of Applicants' presently claimed invention is lacking in Yokota. Therefore, reconsideration and withdrawal of the anticipation rejection are respectfully requested.

Furthermore, with particular reference to claim 4, it is noted that Yokota does not disclose a cylindrical member for fixing the rod lens and the optical fiber chip. Therefore, there is no disclosure that the opposite ends of the cavity are eccentric to each other as recited in claim 4.

At page 4 of the Office Action, Claims 2, 8, 9, 11 and 12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Yokota in view of Takahashi U.S. Patent No. 5,682,452. The Examiner admits that Yokota does not

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<sup>2</sup>Applicants' specification, page 7, lines 12-17.

<sup>3</sup>Id., lines 17-20, explaining the conventional collimator's limitations.

<sup>4</sup>Id., lines 20-24.

<sup>5</sup>Id., sentence bridging pages 7-8.

<sup>6</sup>Id., page 8, lines 3-8.

show the use of a gradient index rod lens. Regarding the admitted deficiency in Yokota, the Examiner cites Takahashi, Fig. 6 (lens 26 or 26', fiber 18 or 18'). The Examiner in the Office Action admits that "Takahashi does not explicitly state that the distributive refractive index rod lens is a gradient lens." The Examiner's position regarding this deficiency in Takahashi is that the lens in Takahashi would have been an equivalent collimating lens, and that using a gradient rod index lens would have been an obvious modification. Applicants respectfully traverse the obviousness rejection for the reason that the combination of Yokota and Takahashi does not teach or suggest the claimed invention.

As has been mentioned above, the presently claimed invention is more removed from Yokota than the Examiner has admitted and recognized. Yokota is lacking more than the disclosure of gradient refractive index lens. Yokota also lacks the disclosure of the optical axis of the optical fiber being "eccentric with respect to a center of said lens to thereby set a quantity of eccentricity of said optical fiber so that the center of said lens substantially coincides with a center of a light beam incident on said lens from said optical fiber" and lacks the feature "wherein an optical path of the optical fiber is eccentric with respect to a center axis of the optical fiber chip" (Applicants' Claim 1, emphasis added). The eccentricity feature of Applicants' presently claimed invention is not disclosed or suggested in Yokota, and is a novel feature that provides unexpectedly superior results over conventional collimators, such as a collimator of Yokota. In the presently claimed invention, a light beam can be transmitted in the effective diameter of the rod lens, so light beam shading and aberration loss can be suppressed.<sup>7</sup> Hence, low insertion loss can be achieved by the presently claimed invention,<sup>8</sup> compared to conventional collimators such as Yokota.

In their specification, Applicants present Figs. 3-5 and a discussion of a measured result of the influence of the eccentric quantity on insertion loss. See Applicants' specification at page 8, line 18+; Figs. 3-5. Applicants in their

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<sup>7</sup>Id., lines 14-16.

<sup>8</sup>Id., lines 16-17.

specification further back up the measured results with simulation data, discussed at Applicants' specification, page 9, line 24+; see also Figs. 6-7.

Takahashi also lacks the disclosure of the optical axis of the optical fiber being "eccentric with respect to a center of said lens to thereby set a quantity of eccentricity of said optical fiber so that the center of said lens substantially coincides with a center of a light beam incident on said lens from said optical fiber" and lacks the feature "wherein an optical path of the optical fiber is eccentric with respect to a center axis of the optical fiber chip". As such, Takahashi does not make up for the deficiencies of Yokota, and the obviousness rejection should not be maintained. Additionally, Applicants note that the assumptions underlying the obviousness rejection is further flawed for claims in which the lens is a gradient refractive index lens, and where the Examiner resorts to the secondary reference Takahashi AND beyond Takahashi, to the Examiner's admitted theorized manipulations of Takahashi. Takahashi and Yokota are not fairly combined and manipulated as the Examiner has proposed.

Yokota and the presently claimed invention are directed to optical fiber collimators, namely, a device in which a lens and an optical fiber are combined in order to collimate light emitted from an optical fiber into parallel light rays or to converge the parallel light rays into the optical fiber.<sup>9</sup> An optical fiber collimator is useful where light rays need to be kept parallel particularly in a long distance, for example, in an optical device having a structure in which parallel light rays pass through any kind of optical function device.<sup>10</sup>

Takahashi is directed to optical devices with different functions. Takahashi does not even mention a collimator or working with parallel light rays. Rather, Takahashi was concerned with optical wave demultiplexing/multiplexing. Takahashi, for example, worked with a light beam of two wavelengths passing through a single optical fiber and being demultiplexed into two different optical fibers, or different rays of different wavelengths respectively passing through two

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<sup>9</sup>See Applicants' specification at page 1, lines 1-6.

<sup>10</sup>Id., lines 6-10.

optical fibers being multiplexed and guided through a single optical fiber. Working based on the different wavelengths of light beams (Takahashi) is different than working with parallel light rays and/or keeping light rays parallel (collimators, and the presently claimed invention). Thus, the Examiner's resort to Takahashi is artificial. A person of ordinary skill in the art would not have used Takahashi to modify Yokota. The Examiner is only drawn to propose the modification now because Applicants' specification has told the Examiner about the advantageous eccentricity feature for collimators. A person of ordinary skill in the art, looking only at Yokota and Takahashi without the benefit of Applicants' present specification would see Yokota and Takahashi as separate, and no modification of one reference based on the other reference would occur to such a person of ordinary skill.

Moreover, as the Examiner himself pointed out in the Office Action, even with Takahashi AND Yokota, the presently claimed invention still does not result. Rather, the Examiner needed to propose further modifications and assumptions. The Examiner only builds those modifications and assumptions based on the benefit of Applicants' invention and Applicants' specification; those several layers of modifications and assumptions do not exist for a person of ordinary skill in the art of collimators.

Thus, for the several reasons set forth above, Applicants respectfully submit that the obviousness rejection of Claims 2, 8-9 and 11-12 should be reconsidered and withdrawn.


With respect to new claim 15, it is noted that the advantage of having a cylindrical member with a constant internal diameter and having the lens and the optical fiber chip have the same outer diameter is that the fixing element can be obtained more easily. Fabrication of a cylindrical member with a through hole is easy to fabricate. No references of record contemplate such a configuration.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview.

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A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,

  
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